Rapid Ecological Assessment for the Northeast Sands Ecological Landscape

An Inventory and Analysis of Rare Plants and Animals and High-quality Natural Communities in Support of a Master Plan

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Cover Photos: Poor fen at Town Corner Cedars SNA (Rich Staffen), bracken grassland at Dunbar Barrens (Eric Epstein), northern blue butterfly (Mike Reece), Kirtland's warbler (DNR staff), dragon's-mouth orchid (*Arethusa bulbosa*, Rich Staffen).

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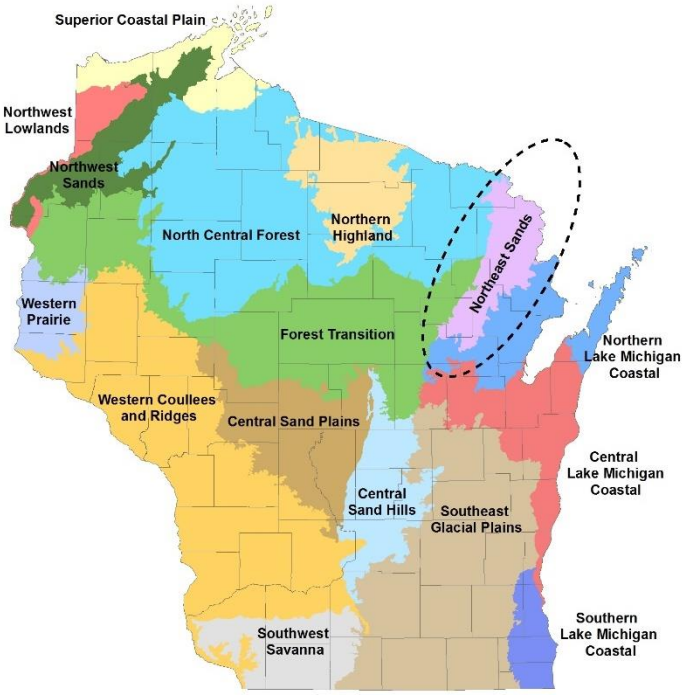
Introduction

Purpose and Objectives

This report is intended to be used as a source of information for developing the master plan for the Northeast Sands Ecological Landscape (NES EL; Map A).

The primary objectives of this project were to collect biological inventory information relevant to the master plan for properties in the NES EL and to analyze, synthesize and interpret this information for use by the master planning team. This effort focused on assessing areas of documented or potential habitat for rare species and identifying natural community management opportunities.



Map A. Ecological Landscapes of Wisconsin.

Surveys for the NES EL were conducted in 2018 and focused on 1) identifying and evaluating ecologically important areas, 2) documenting or updating rare species occurrences, and 3) documenting or updating occurrences of high quality natural communities. This report serves as the "Biotic Inventory" document used for master planning. There will undoubtedly be gaps in our knowledge of the biota of this property, especially for certain taxa groups; these groups have been identified as representing either opportunities or needs for future work. Inventory data collected through this effort is a starting point for adaptive management of properties in the NES EL and should be revisited periodically and updated when new information becomes available.

This inventory was limited to properties being actively planned that had not previously been inventoried by the Wisconsin DNR's Bureau of Natural Heritage Conservation (NHC) (Table 1). Previous inventories also relevant to the NES EL should be consulted as necessary for a more complete assessment of the conservation opportunities for properties in the Northeast Sands (Table 2).

Table 1. Properties included in Northeast Sands Ecological Landscape rapid ecological assessment.

Amberg Wildlife Area
Dunbar Barrens SNA
Miscauno Wildlife Area (including Miscauno Cedar Swamp SNA)
Peshtigo Brook Wildlife Area (including Peshtigo Brook Meadow and Woods SNA)
Shawano Lake Fishery Area
South Branch Oconto River Fishery Area
Town Corner Wildlife Area (including Town Corner Cedars SNA)

Table 2. Properties in the Northeast Sands Ecological Landscape inventoried through previous NHI biotic inventory and rapid ecological assessments.

Property	Planning Group	Year Surveyed
Governor Thompson State Park	Peshtigo River State Forest (WDNR 2006)	2002-2003
Menominee River State Park and Recreation Area	Menominee River State Recreation Area Management Plan (MDNR and WDNR 2017)	2013
Peshtigo River State Forest	Peshtigo River State Forest (WDNR 2006)	2002-2003
Pike Wild River	Pike Wild River (WDNR 2012)	2011
Spread Eagle Barrens SNA	Florence County Wild Rivers and Barrens Planning Group (WDNR 2011)	2010

Overview of Methods

The Wisconsin Natural Heritage Inventory (NHI) program is part of the Wisconsin DNR's Bureau of Natural Heritage Conservation (NHC) and is a member of an international network of natural heritage programs representing all 50 states, as well as portions of Canada, Latin America, and the Caribbean. These programs share certain standardized methods for collecting, processing, and managing data for rare species and natural communities. NatureServe, an international non-profit organization (see *www.NatureServe.org* for more information), coordinates the network.

Natural heritage programs track certain elements of biological diversity: rare plants, rare animals, high-quality examples of natural communities, and other selected natural features. The NHI Working List (WDNR 2018) contains the elements tracked in Wisconsin. They include endangered, threatened, and special concern plants and animals, as well as the natural community types recognized by NHI. The NHI Working List is periodically updated to reflect new information about the rarity and distribution of the state's plants, animals, and natural communities. The most recent Working List is available from the Wisconsin DNR website (*Wisconsin Natural Heritage Working List*).

The Wisconsin NHI uses standard methods for biotic inventory to support master planning. Our general approach involves collecting relevant background information, planning and conducting surveys, compiling and analyzing data, mapping rare species and high quality natural community locations into the NHI database, identifying ecologically important areas, and providing interpretation of the findings through reports and other means.

Existing NHI data are often the starting point for conducting a biotic inventory to support master planning. NHC's biotic inventory projects typically start with a coarse-filter assessment, followed by targeted surveys for priority taxa, then data processing, analysis and report writing. Survey scope and intensity corresponds to the study area size and ecological complexity, as well as resource availability.

Field surveys for the NES EL were focused on documenting high quality natural communities, rare plants, breeding birds, and herptiles (Table 2). The collective results from these surveys were used, along with other information, to identify, evaluate, and update ecologically important areas (Primary Sites) of the NES EL.

Table 3. Survey Targets and Methods for Biotic Inventory on the Northeast Sands EL in 2018.

Survey Target	Surveyors	Methods
Animals		
Breeding Birds	NHC Staff	Surveys followed point count and Wisconsin Breeding Bird Atlas II protocols. Emphasis placed on areas not covered by Atlas blocks.
Herps	NHC Staff	Visual encounter searches for snakes and lizards, calling surveys for frogs and toads
Invertebrates	NHC Staff, Amy Wolf	Visual encounter searches for bumblebees
Small Mammals	NHC Staff	Transects utilizing Sherman live traps
Rare plants	NHC Staff	Meander surveys targeting barrens, wetlands, and forests.
Natural Communities	NHC Staff	Meander surveys focused on characteristic species, community boundaries, threats and management issues.

Survey locations were identified or guided by using recent aerial photos, USGS 7.5' topographic maps, various Geographic Information System (GIS) sources, information from past survey efforts, discussions with property managers, and the expertise of several biologists familiar with the properties or with similar habitats in the region. Based on the location and ecological setting of properties within the NES EL, key inventory considerations included the identification of oak and pine forests, northern wet-mesic forests, barrens, high-quality open and shrub-dominated wetlands, and the location of habitats that had the potential to support rare species. Private lands, including easements, were not surveyed.

In this report, the first mention of plant species and invertebrate animals in the text is followed by scientific names in parentheses. Plant nomenclature follows the Wisconsin State Herbarium (WIS). Vertebrate animals follow standard common names.

For a description of the geology, historical vegetation, and current vegetation of the Northeast Sands EL, please see Chapter 13 of the Ecological Landscapes of Wisconsin (dnr.wi.gov, keyword Ecological Landscapes).

Management Considerations and Opportunities for Biodiversity Conservation

The Ecological Landscapes of Wisconsin highlights five major conservation and management opportunities for the Northeast Sands Ecological Landscape (WDNR 2015a). These are summarized below, and a list of Primary Sites are presented under each item as examples. This list of sites is not meant to be exhaustive. Property planners and managers may identify important resources outside of primary sites by consulting the NHI Portal, NHI Biotic Inventory survey data or contractor reports, NHC District Ecologists, and other resources noted in the subsections below.

Extensive Forests

Roughly 75% of the Northeast Sands Ecological Landscape (746,084 acres) is forested. The ecological landscape's extensive forests play a significant role in maintaining viable populations of many native plants and animals, including some that are scarce or declining. This large acreage of forest allows for management at larger scales, where diverse cover types can support a mosaic of habitats and a greater number of species, and broad landscape connections allow species to move among habitats as they fulfill their various life history needs. Diverse cover types can include different successional stages of forest and diverse natural communities.

All forest communities have value for the conservation of biodiversity, but types such as northern dry forests are especially well represented and important in the Northeast Sands when compared with other areas of the state. Northern dry forests composed mostly of jack pine or mixed with red pine and scrub oak are common and well suited to site conditions in many parts of this ecological landscape. Managing for a mosaic of northern dry forest, pine barrens, and bracken grassland communities will help maintain habitat for sensitive species requiring the presence of structural features associated with all three of these communities.

Northern wet-mesic forests dominated by northern white-cedar are common in the NES EL, and these forests harbor high numbers of rare or uncommon plants and animals. The greatest challenges in protecting these vulnerable forested wetlands include maintaining their hydrological regimes (or restoring altered ones) and limiting the negative impacts of deer browse on northern white-cedar regeneration.

Properties inventoried in 2018 with good-quality examples of extensive forests include:

- Amberg Wildlife Area (see Amberg Swamp Conifers primary site description below)
- Miscauno Wildlife Area and Miscauno Cedar Swamp SNA (see primary site description below)
- Town Corner Cedars SNA (see primary site description below)

Barrens and Bracken Grasslands

Historically there were extensive areas of semi-open barrens and bracken grasslands mixed with dry forest in the Northeast Sands. These fire-dependent natural communities were concentrated in Marinette County (e.g., near Athelstane and Dunbar and in the Spread Eagle area of eastern Florence County). There are historical records of rare barrens fauna from this area, including Kirtland's warbler and the Karner blue and northern blue butterflies.

While the barrens are an important conservation feature in the NES EL, the northerly location in the state reduces the number of species present. This is especially true to herptiles, mammals, and plants. The prairie component of the barrens flora is gradually diminished from south to north. However, some

species may migrate north over time as they adapt to a changing climate, making northern barrens as well as north-south connectivity important for long-term conservation.

Bracken grassland is a regionally unique type of pine barrens concentrated in the NES EL and occurs on rolling uplands and depressions or frost pockets in pitted outwash topography. This community type provides important habitat for wildlife species that favor open grassland/barrens expanses, such as the sharp-tailed grouse, a state Special Concern species. Opportunities to manage bracken grassland and barrens at a landscape level could be explored with adjoining property owners. Managing large tracts of land for barrens using a variety of methods can help to mimic diverse natural disturbance patterns that are important to many barrens dependent species (Radeloff et al. 2000). In addition to previously identified properties such as Spread Eagle Barrens SNA, a property in the group with good-quality barrens habitat is:

- Dunbar Barrens SNA (see primary site description below)

Rivers and Stream Corridors

Several streams in the NES EL streams offer opportunities to protect aquatic habitats of high biodiversity value. In addition, some streams are bordered by bedrock outcroppings, stands of conifers, and/or relatively old forest. These stream corridors can support species that are rare elsewhere in the ecological landscape and region. For example, rivers in the NES EL provide some of the best habitat in the state for wood turtle. In at least some cases, these streams may afford the best chances to connect small, scattered stands of older forest, especially coniferous forest, that persist along streams on state lands.

The Wolf and Menominee rivers present the best opportunities for maintaining and enhancing large river habitats. Submerged wood is vitally important in all streams but particularly in larger rivers where substrate diversity is lacking and unstable bottom substrates of shifting sand, silt, or clay are prevalent. Removal of surveyed dams and drop structures can help improve stream habitat, habitat connectivity, water quality, and hydrologic regime. The corridor of large rivers such as the Menominee are especially significant and maintaining connectivity of aquatic habitats is important regionally. In addition to previously inventoried properties such as the Pike Wild River and Menominee River, properties inventoried in 2018 with good examples of stream corridors include:

- Peshtigo Brook Wildlife Area (see Peshtigo Brook Floodplain and Shrub-carr primary site description below)

Bedrock Features

Exposures of bedrock are prominent and locally common in parts of the Northeast Sands. In areas cut by streams, rockwalled gorges, glades, and cliffs may be present. Uncommon plants and animals have the potential to occur in these habitats. Bedrock specialists, including rare plants, have been identified at several locations. To date, coordinated survey efforts have been focused on limited areas within specific public lands. Additional inventory work is warranted, ideally including taxa other than vascular plants, such as nonvascular plants and invertebrates. In addition to previously inventoried properties such as the Pike Wild River and Menominee River, properties in this group with good examples of bedrock features include:

- Dunbar Barrens SNA (see primary site description below)

Non-forested Wetlands

Non-forested wetlands are also important in the Northeast Sands, especially bogs, sedge meadows, poor fens, and marshes. Wetlands serve to slow the release of water during storms (thus minimizing flooding), filter nutrients and pollutants that are carried in runoff, and provide moisture banks during low water

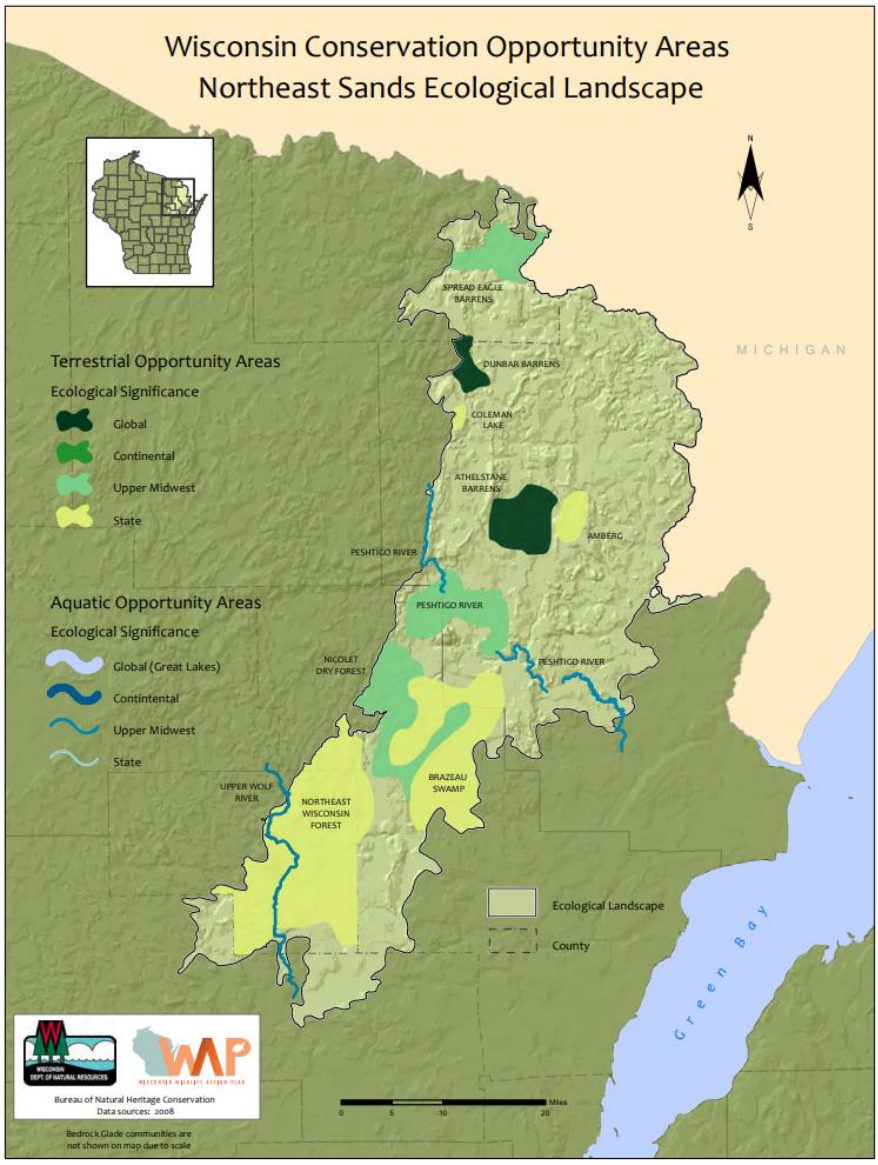
periods or droughts. They also provide vital habitat for a large number of rare plants and animals. Properties in this group with good examples of wetlands include:

- Peshtigo Brook Wildlife Area (see primary site descriptions for Peshtigo Brook Meadow and Woods SNA and Peshtigo Brook Floodplain and Shrub-carr below)

Wildlife Action Plan Implementation and the Northeast Sands Ecological Landscape

Conservation Opportunity Areas

Conservation Opportunity Areas (COAs) are places in Wisconsin that contain ecological features, natural communities, or SGCN habitat that present the greatest likelihood of successfully implementing conservation actions when viewed from the global, continental, upper Midwest, or state perspective. Several COAs occur in the NES EL (WDNR 2008).



Opportunities for Natural Community Conservation

Opportunities for sustaining natural communities in Ecological Landscapes were developed in 2005 by the Ecosystem Management Planning Team (EMPT, published in 2007) and later focused on wildlife Species of Greatest Conservation Need and their habitat in the Wisconsin Wildlife Action Plan (WDNR 2015b). The goal of sustaining natural communities is to manage for natural community types that 1) historically occurred in a given landscape and 2) have a high potential to maintain their characteristic composition, structure, and ecological function over a long period of time (e.g., 100 years). This list can help guide land and water management activities so that they are compatible with the local ecology of the Ecological Landscape while maintaining important components of ecological diversity and function. Based on EMPT's criteria, these are the most appropriate community types that could be considered for management activities within each Ecological Landscape.

The Wisconsin Wildlife Action Plan (WDNR 2015b) identifies 29 natural communities that occur on DNR properties and for which there are "High" or "Moderate" opportunities for protection, restoration, or management on the Northeast Sands Ecological Landscape (Table 3). For information on conservation actions that are beneficial for these communities, please refer to the Wisconsin DNR website, keyword "Wildlife Action Plan".

Table 4. Natural Communities that occur on DNR properties with High or Moderate Opportunities for Protection, Restoration or Management in the Northeast Sands Ecological Landscape (WDNR 2015b).

Community Type	
Alder Thicket	Northern Dry-mesic Forest
Aspen-Birch	Northern Hardwood Swamp
Bedrock Glade	Northern Mesic Forest
Black Spruce Swamp	Northern Sedge Meadow
Bracken Grassland	Northern Tamarack Swamp
Coldwater streams	Northern Wet Forest
Conifer Plantation	Northern Wet-mesic Forest
Coolwater streams	Open Bog
Emergent Marsh	Pine Barrens
Floating-leaved Marsh	Poor Fen
Lacustrine Mud Flat	Spring Pond, Lake--Spring
Lake – hard, bog	Springs and Spring Runs, Soft
Lake – Unique	Springs and Spring Runs, Hard
Lake – soft, bog	Submergent Marsh
Northern Dry Forest	

Opportunities to Conserve Species of Greatest Conservation Need (SGCN) and Rare Plants

The Wisconsin Wildlife Action Plan also notes Species of Greatest Conservation Need (SGCN; WDNR 2015d) associated with each Ecological Landscape. Species of Greatest Conservation Need are animals that have low and/or declining populations that need conservation action. They include various birds, mammals, reptiles, amphibians, and invertebrates (e.g., dragonflies, butterflies, and freshwater mussels) that:

- Are already listed as threatened or endangered;
- Have few, low, or declining populations, and/or threats their populations or habitats;
- Are stable in number in Wisconsin, but declining in adjacent states or nationally;
- Have biological, genetic or ecological characteristics that place them at risk or make them vulnerable to decline.

There are 55 SGCN and 22 rare plants highly or moderately associated with the Northeast Sands Ecological Landscape. This means that these species are significantly associated with the EL, and that restoration of natural communities with which these species are associated would significantly improve their conditions.

The Wisconsin Wildlife Action Plan also identifies ecological priorities for conservation by highlighting the natural communities in each Ecological Landscape that are most important to the SGCN (Figure 1). While many communities that occur on the NES EL have major or important conservation opportunities, some of these communities support more SGCN and rare plant species than others (Figure 2). For example, pine barrens support a considerable number of rare species in the NES EL. Although not all of these rare species necessarily occur on pine barrens on DNR properties, natural communities with higher species counts provide a disproportionate benefit to a greater number of SGCN and rare plants across the NES EL and may warrant special consideration in the master planning process. This intersection of SGCN and rare plants with priority natural communities represents the best opportunities for management on the NES EL from an ecological and biodiversity perspective. For a complete list of which SGCN are associated with the NES EL, please see the Wisconsin Wildlife Action Plan website (https://dnr.wi.gov/, keyword "Wildlife Action Plan"), or for species associated with specific natural communities, see the natural community pages (https://dnr.wi.gov/, keyword "Natural Communities").

Figure 1. Diagram of ecological priorities based on the Wildlife Action Plan.

Taxa and species-specific conservation opportunities include:

- Kirtland's warbler (State Endangered, Federal Endangered) occurs in the NES EL, which comprises the second-largest breeding population of this rare bird in the state. Other barrens and grassland birds found here in good numbers are brown thrasher, eastern whip-poor-will, common nighthawk, vesper sparrow, grasshopper sparrow, and red-headed woodpecker.
- Golden-winged warbler, which requires a habitat mosaic of brushy forest openings, shrubby wetlands or brushy grasslands, and adjacent areas of more mature forest. These habitats are also important for American woodcock.
- Uncommon northern forest small mammals like northern flying squirrel, woodland jumping mouse, and woodland deer mouse are found throughout forested areas.
- The NES EL is one of the most important landscapes in the state for the wood turtle.
- The northern blue butterfly (*Lycaeides idas*, State Endangered) is found only in northeastern Wisconsin in association with the larval host plant, dwarf bilberry (*Vaccinium cespitosum*, State Endangered). Dwarf bilberry occurs in small patches beneath scattered pines on sandy soils in association with bracken fern, sweet-fern, and barren-strawberry. Another butterfly, Chryxus arctic (*Oeneis chryxus*) is found in dry grass habitats, cutovers, jack pine barrens, and in rocky and grassy openings.
- The northern barrens tiger beetle (*Cicindela patruela patruela*) occurs in semi-open pine/oak barrens and sandy openings in pine stands.
- Several rare dragonflies associated with clean, fast-flowing rivers and streams occur in the NES EL, including the extra-striped snaketail (*Ophiogomphus anomalus*, State Endangered) and the delta-spotted spiketail (*Cordulegaster diastatops*, special concern), known only from the NES

EL. The plains emerald (*Somatochlora ensigera*), forcipate emerald (*S. forcipata*), and slaty skimmer (*Libellula incesta*) are also strongly associated with the NES.

- Several rare snails occur in the NES EL, including the eastern flat-whorl (*Planogyra asteriscus*), found in wetlands with northern white-cedar.
- Several rare plants are well represented in the NES EL compared with other ELs, including Missouri rockcress (*Boechera missouriensis*), Rocky Mountain sedge (*Carex backii*), white adder's-mouth orchid (*Malaxis monophyllos* var. *brachypoda*), marsh grass-of-Parnassus (*Parnassia palustris*), dwarf bilberry (*Vaccinium cespitosum*), Blue Ridge blueberry (*Vaccinium pallidum*), marsh valerian (*Valeriana uliginosa*), and narrow-leaved vervain (*Verbena simplex*).

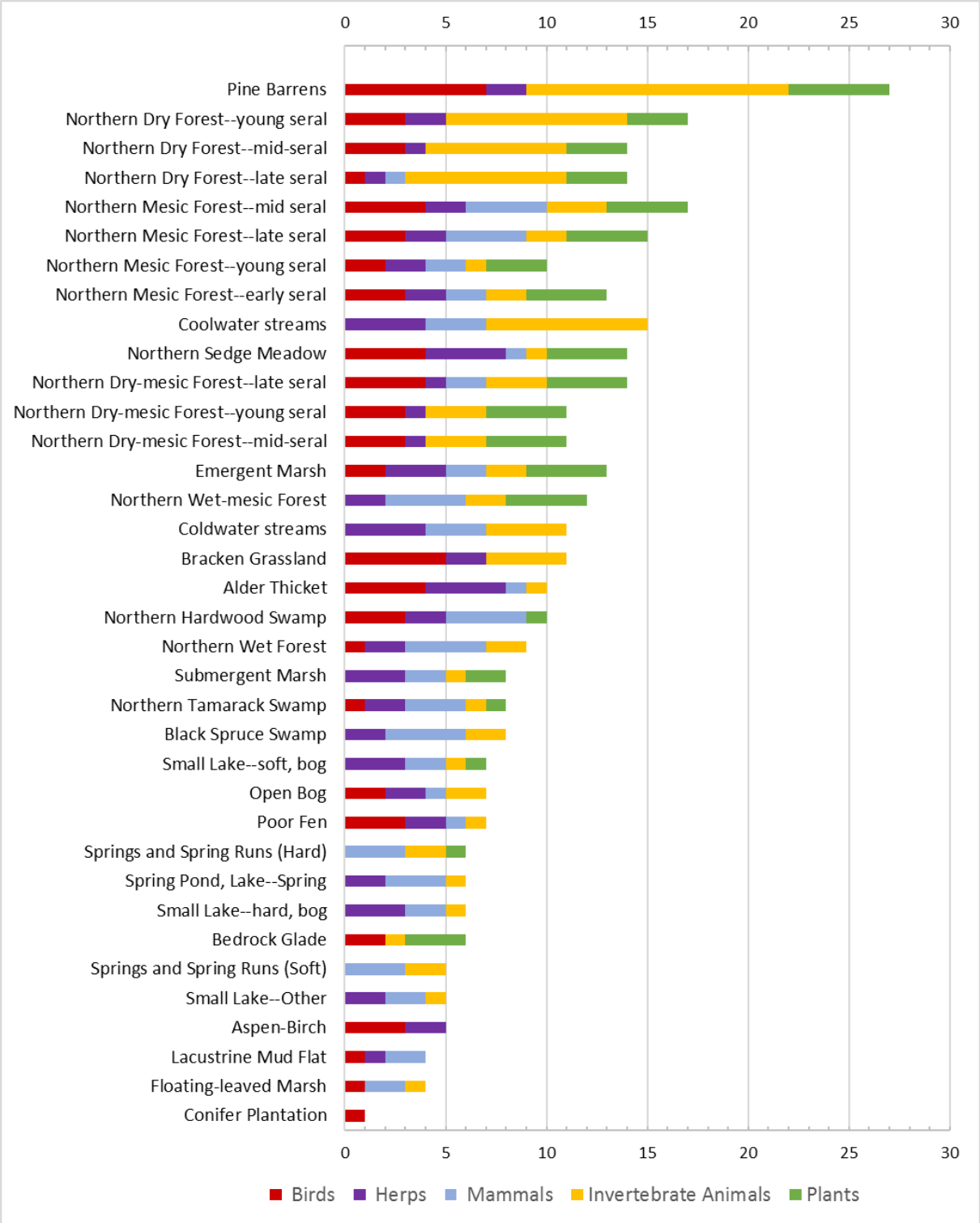


Figure 2. Number of SGCN and Rare Plants Highly or Moderately Associated with Natural Communities that have High or Moderate Opportunities for Protection, Restoration or Management in the Northeast Sands Ecological Landscape.[1]

[1] Figure represents the SGCN and rare plants that are moderately or highly associated with the respective natural communities. Species and natural communities represented are limited to those that are moderately to highly associated with the Northeast Sands Ecological Landscape.

Primary Sites: Site-specific Opportunities for Biodiversity Conservation

Six ecologically important sites were identified on the Northeast Sands Ecological Landscape (NES EL) during surveys in 2018. These "Primary Sites" were delineated because they generally encompass the best examples of:

1) Rare and representative natural communities,
2) Documented occurrences of rare species populations, and/or
3) Opportunities for ecological restoration or connections.

Table 5. Northeast Sands Ecological Landscape Rapid Ecological Assessment Primary Sites based on 2018 surveys.

Code	Primary Site Name
NESEL01	Miscauno Cedar Swamp SNA
NESEL02	Town Corner Cedar SNA
NESEL03	Peshtigo Brook Floodplain and Shrub-carr
NESEL04	Peshtigo Brook Meadow and Woods SNA
NESEL05	Amberg Swamp Conifers
NESEL06	Dunbar Barrens SNA

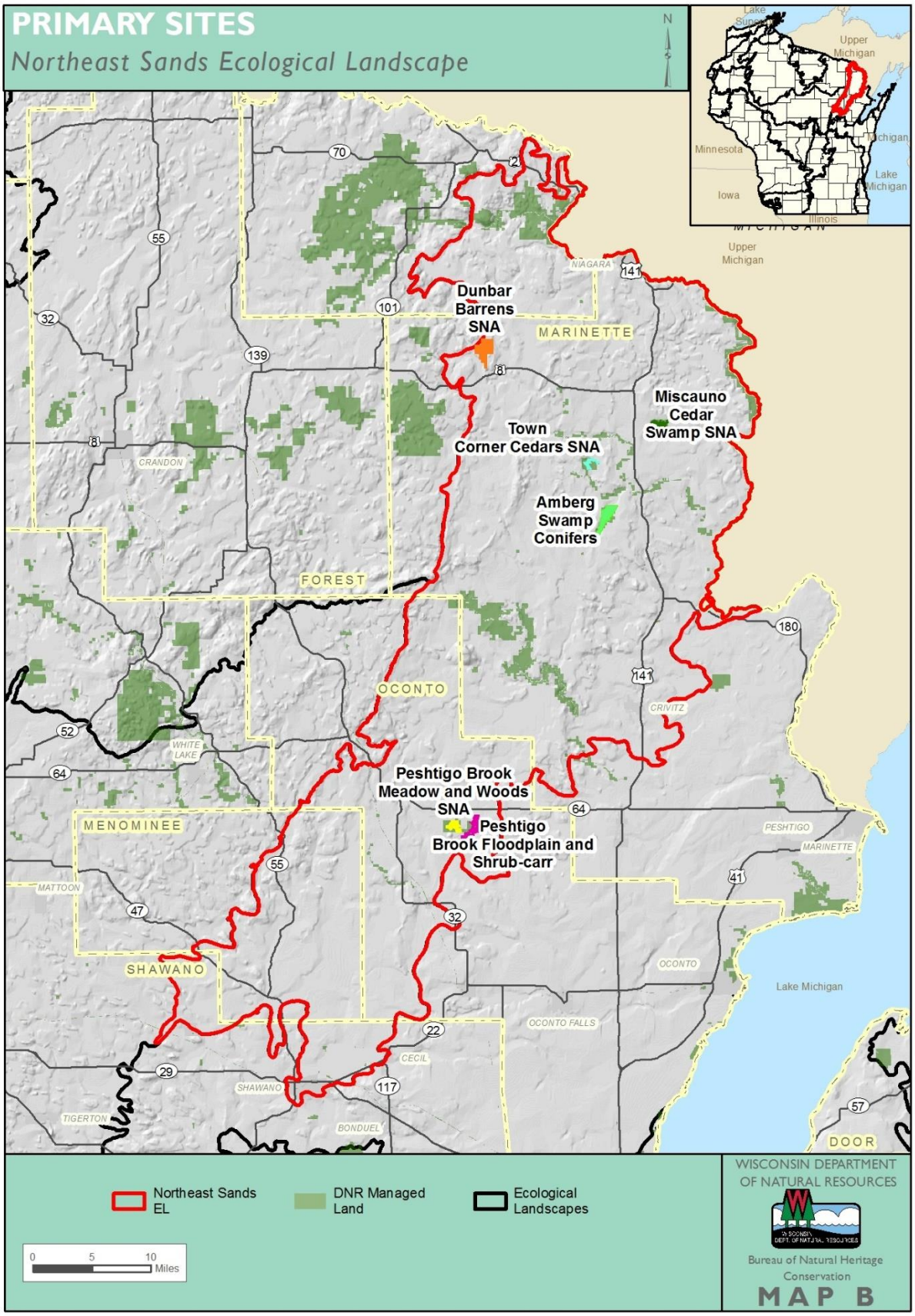
These sites warrant high protection and/or restoration consideration during the development of the property master plan. This report is meant to be considered along with other information when identifying opportunities for various management designations during the master planning process.

Primary Sites are also considered High Conservation Value Forests (HCVFs) for the purposes of Forest Certification, which requires the identification and periodic monitoring of HCVFs. All DNR-managed lands, including state forests, parks, wildlife and fishery areas, and natural areas are certified. Certified forests are recognized by the Forest Stewardship Council (FSC) and the Sustainable Forestry Initiative (SFI) as being responsibly managed (Forest Stewardship Council 2009).

Information provided in the summary paragraphs below includes location information, a site map, summary of the natural features present, important plant and animal species, the site's ecological significance, and management considerations.

The Primary Sites described below are in addition to the sites identified during other Rapid Ecological Assessments and Biotic Inventory Reports that occur within or partially within the NES EL. These include:

- Peshtigo River State Forest (WDNR 2006)
- Florence County Wild Rivers and Barrens Planning Group (WDNR 2011)
- Pike Wild River (WDNR 2012)


PRIMARY SITES
Northeast Sands Ecological Landscape
N
Upper Michigan
Minnesota
Iowa
Illinois
Lake Michigan
Dunbar Barrens SNA
Miscauno Cedar Swamp SNA
Town Corner Cedars SNA
Amberg Swamp Conifers
Peshtigo Brook Meadow and Woods SNA
Peshtigo Brook Floodplain and Shrub-carr
MARINETTE
FOREST
OCONTO
MENOMINEE
SHAWANO
DOOR
CRANDON
NIAGARA
CRIVITZ
WHITE LAKE
MATTOON
PESHTIGO
OCONTO FALLS
CECIL
SHAWANO
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BONDUEL
Lake Michigan
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MAP B

NESEL01. MISCAUNO CEDAR SWAMP SNA

Location

Property:	Miscauno Wildlife Area
Landtype Association:	Amberg Moraines (212Tc11)
Approximate Size:	436 acres

Description of Site

Miscauno Cedar Swamp State Natural Area (SNA) is located within Miscauno Wildlife Area and features a northern wet-mesic forest in a steep-sided basin along the South Branch of Miscauno Creek. The timber varies from nearly pure stands of timber-sized to pole-sized white-cedar to mixtures of white-cedar, balsam fir, and black spruce with black ash and elm along the stream. The adjacent uplands are a northern dry forest of aspen, oak and pine. The ground layer is rich in smaller orchid species along with one-flowered pyrola, bunchberry, American starflower, yellow blue-bead-lily, gaywings, Canada mayflower, and several ferns. In the numerous headwater springs is a rich flora of mosses and lichens.

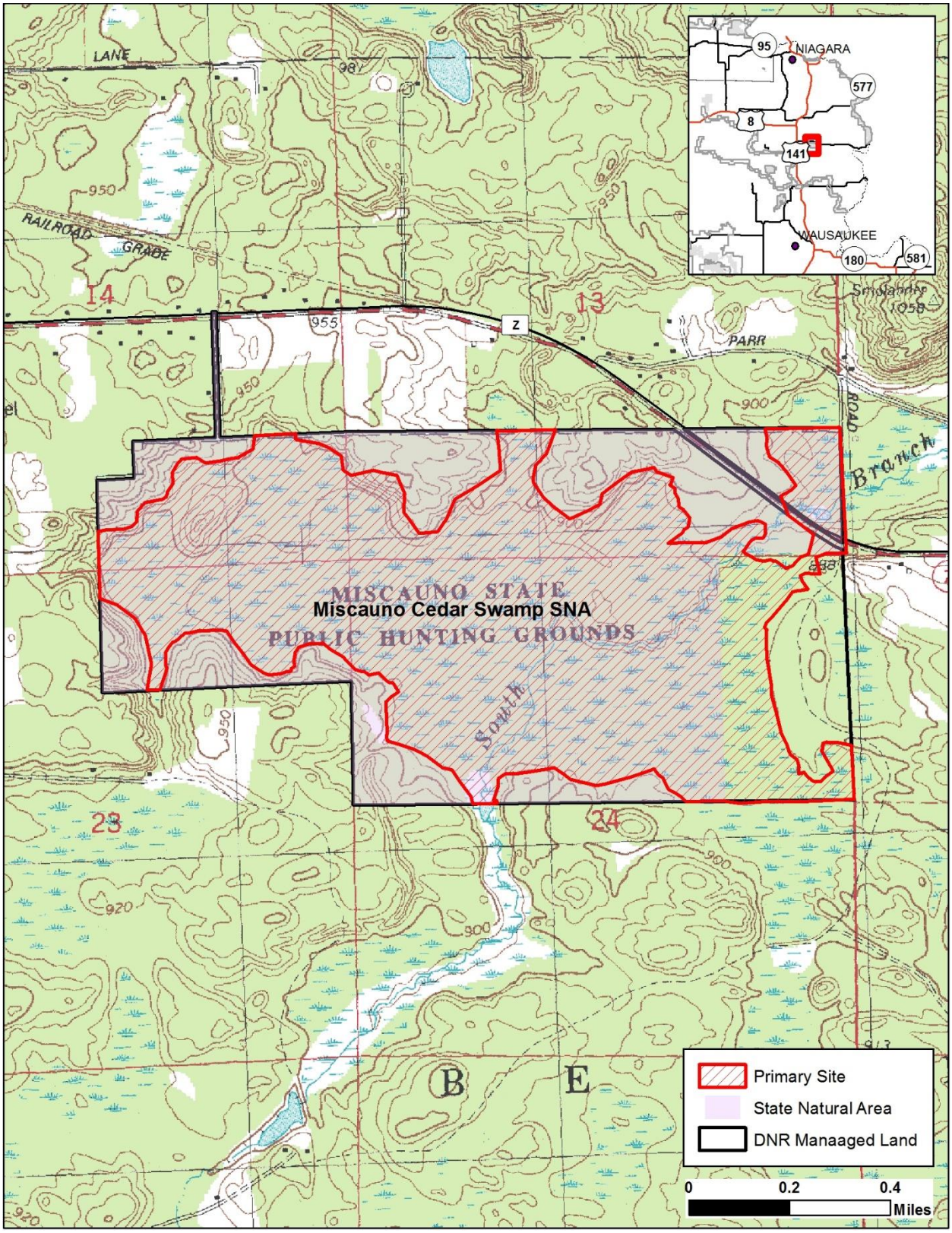
Significance of Site

Although the lowlands were logged in the distant past they still retain natural conditions. The swamp was also the site of a 20-year research study looking at the effects of cedar thinning. Miscauno Creek has been designated as an Outstanding Resource Water (ORW), and the largely intact cedar swamp protects the headwaters of this creek and helps to preserve its high water quality. There are several small mammal Species of Greatest Conservation Need found within the site, as well as rare birds. Breeding bird surveys have shown that uncommon birds such as veery, wood thrush, brown creeper, golden-crowned kinglet, cape may warbler, magnolia warbler, Canada warbler, and black-billed cuckoo are found during the nesting season. Small mammal surveys found a high diversity of species, including woodland deer mouse, short-tailed weasel, meadow jumping mouse, red-backed vole, and masked shrew, but did not relocate two SGCN mammals found here previously. This site was identified as a "Wetland Gem" by Wisconsin Wetlands Association for its high-quality wetland habitat (Wisconsin Wetlands Association 2009). Miscauno Cedar Swamp was designated as an SNA in 1971.

Management Considerations

Site objectives are to manage the SNA as a northern wet-mesic forest reserve, an aquatic reserve, and as an ecological reference area. Natural processes should determine the structure of the northern wet-mesic forest and stream. In addition, canopy and understory manipulation in the northern dry forest may be prescribed to restore and maintain desired structure and function. The site also could provide opportunities for research and education on the highest quality native northern wet-mesic forests.

In the northern wet-mesic forest, the native species should be managed passively, which allows nature to determine their ecological characteristics. In the northern dry forest, the native dominant tree species (primarily pines and oaks) are managed to maintain the cover type. However, forest harvest in the uplands needs to assure that the wetlands are not affected, and that old forest is promoted by using extended rotations. Across the entire site, allowable activities include control of invasive plants and animals, maintenance of existing facilities, and access to suppress fires. European marsh thistle is present here. Salvage of trees after a major wind event in the wetlands is not considered compatible with management objectives.



NESEL01. Miscauno Cedar Swamp SNA Primary Site

NESEL02. TOWN CORNER CEDARS SNA

Location

Property:	Town Corner Wildlife Area
Landtype Association:	Athelstane Moraines (212Tc06)
Approximate Size:	306 acres

Description of Site

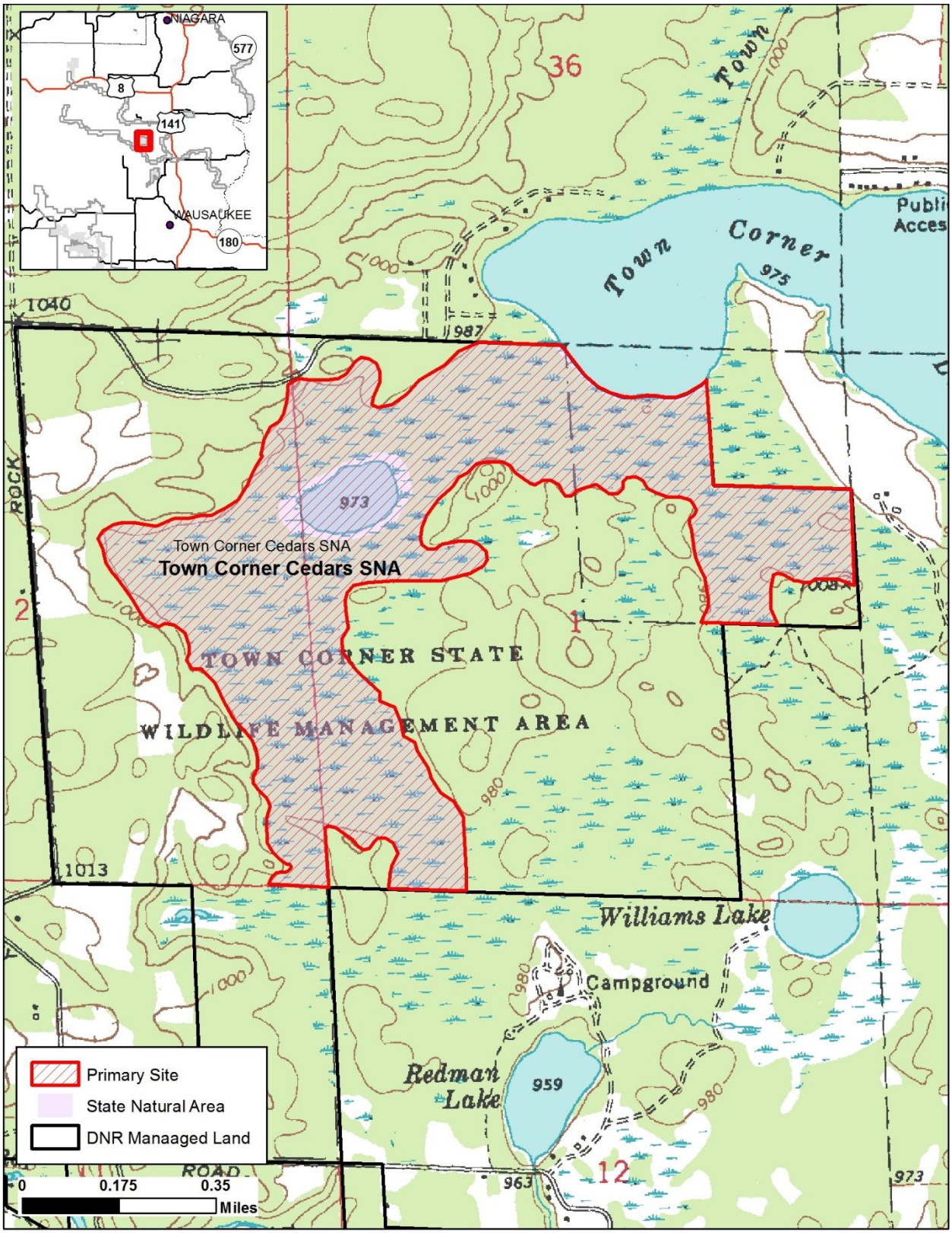
Town Corner Cedars SNA occurs within Town Corner Wildlife Area and supports northern wet-mesic forest with high ecological integrity that is dominated by white-cedar with tamarack, black spruce, balsam fir, and scattered white pine. A carpet of mostly sphagnum with other mosses blankets the forest floor and supports a ground flora that includes three-leaved goldthread, naked miterwort, marsh fern, blunt-leaved orchid, American starflower, twin-flower, one-flowered pyrola and liver-leaf wintergreen, A wide variety of lichens can be found growing within the forest, enhancing the site's diversity. A small undeveloped seepage lake is situated in the center of the cedar swamp with good cedar reproduction occurring on the lake's north shore. Surrounding the small lake is a firm to floating poor fen.

Significance of Site

Town Corner Cedars SNA encompasses a large good-quality cedar swamp as well as a 10-acre wilderness lake bordered by a small but exemplary poor fen with numerous uncommon plants. The size and quality of the cedar stand make it an important representative of this natural community type in this landscape. The site was designated a State Natural Area in 2007. Numerous bird Species of Greatest Conservation Need are present in or immediately adjacent to the site. Many of these species nest in the uplands or periphery of the cedar swamp but utilize the site to forage or raise fledged young. The small lake in the center of the site was recognized as an important conservation target in The Nature Conservancy's Lake Conservation Portfolio (Blann and Wagner 2014).

Management Considerations

Stated management objectives are to manage the site as a reserve for northern wet-mesic forest, as an aquatic reserve and wetland protection site, and as an ecological reference area. Natural processes should determine the structure of the forest. The site also provides opportunities for research and education on the highest quality native northern wet-mesic forests. The native species are managed passively, which allows nature to determine the ecological characteristics of the site. Exceptions include control of invasive plants and animals, maintenance of existing facilities, and access to suppress fires. Salvage of trees after a major wind event is not considered compatible with management objectives. European marsh thistle is present in the cedar swamp. Native phragmites was noted in the poor fen during 2007 surveys, and broad-leaf cattail is also present. Some control (cut and stem treatment) of the native phragmites was done in 2014. These species should be monitored and controlled further if necessary.



NESEL02. Town Corner Cedars SNA Primary Site

NESEL03. PESHTIGO BROOK FLOODPLAIN & SHRUB-CARR

Location

Property:	Peshtigo Brook Wildlife Area
Landtype Association:	Butler Plains (212Tc03)
Approximate Size:	850 acres

Description of Site

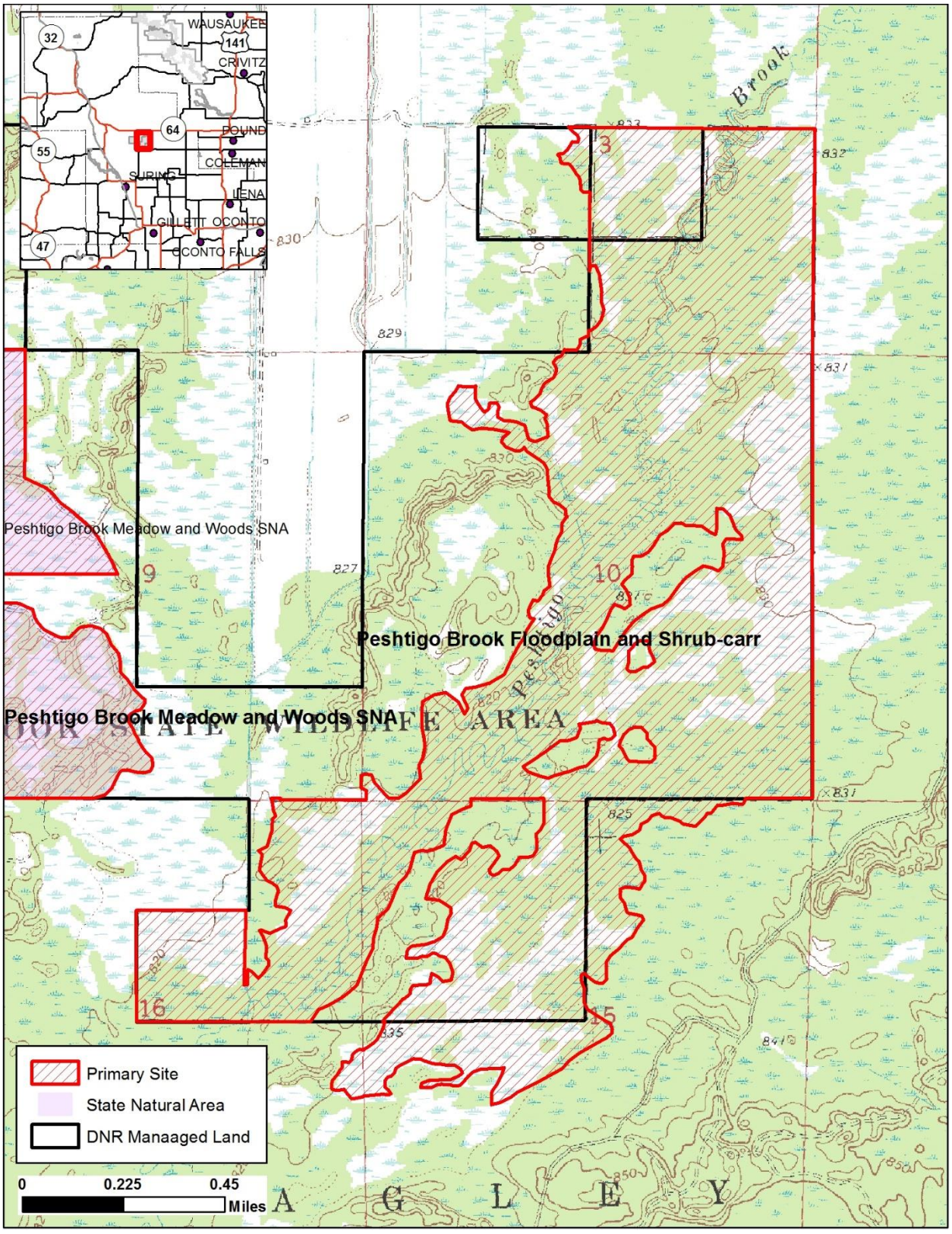
Located in the eastern portion of Peshtigo Brook Wildlife Area, this site features a narrow swath of floodplain forest surrounded by extensive shrub-carr, which grades into hardwood swamp; the floodplain forest and shrub-carr have high ecological integrity. The floodplain forest is dominated by silver maple and black ash, while the shrub-carr contains a high diversity of native wetland shrubs including pussy willow, speckled alder, and bog birch. Hardwood swamp occurs as scattered stands in the shrub-carr and becomes more extensive toward the southeastern edge of the property. These stands are dominated by red maple and black ash with occasional white cedar and paper birch. Trees average 12-15 inches in diameter, with scattered individuals up to 20 inches dbh. Managed aspen and northern pin oak dominate several islands within the wetland complex.

Significance of Site

The shrub-carr is one of the more diverse and high-integrity examples in the state, possessing qualities similar to the wetlands of the Peshtigo Brook and Meadow SNA to the west. The adjacent hardwood swamp supports a state-threatened wetland plant, while the floodplain forest has notably few invasive species on a free-flowing stream. While no surveys were completed for breeding birds, the site has excellent potential to support a diverse suite of breeding birds, potentially including rare species. The site lies within the Brazeau Swamp Conservation Opportunity Area (COA), designated for its vast wetland complexes featuring high quality forests, sedge meadows, and extensive shrub swamps of state significance (WDNR 2008).

Management Considerations

Maintaining the hydrology and vegetation structure of the natural communities is essential. Active management, such as alder shearing, would likely be detrimental to the integrity of the shrub-carr, particularly to shrub diversity. While emerald ash borer is a threat to black ash in the floodplain forest and hardwood swamp, risk of conversion to non-forest types is low due to the diversity of other tree species. Reed canary grass is present in the floodplain forest and could be spread through flooding or by management operations. Glossy buckthorn is also present in the wetland complex but was not noted as being extensive. The distribution of the infestation should be determined, and a control plan developed accordingly.



NESEL03. Peshtigo Brook Floodplain and Shrub-carr Primary Site

NESEL04. PESHTIGO BROOK MEADOW AND WOODS SNA

Location

Property:	Peshtigo Brook Wildlife Area
Landtype Association:	Butler Plains (212Tc03)
Approximate Size:	477 acres

Description of Site

Peshtigo Brook and Meadow SNA is embedded with the Peshtigo Brook Wildlife Area and is situated on sandy outwash with scattered low sandy ridges and features a mosaic of northern sedge meadow and shrub-carr in and around upland eskers and old beach dunes. Herb cover in the wetlands is moderate to dense and dominated by lake sedge, tussock sedge and woolly-fruit sedge. Shrub cover is sparse to moderate with bog birch, alder, white meadowsweet, and slender willow. The sandy upland ridges support patches of large diameter red oak and white pine up to 34 inches in diameter, though many trees blew down in a tornado in 2014. The uplands are now mostly oak barrens in the process of restoration.

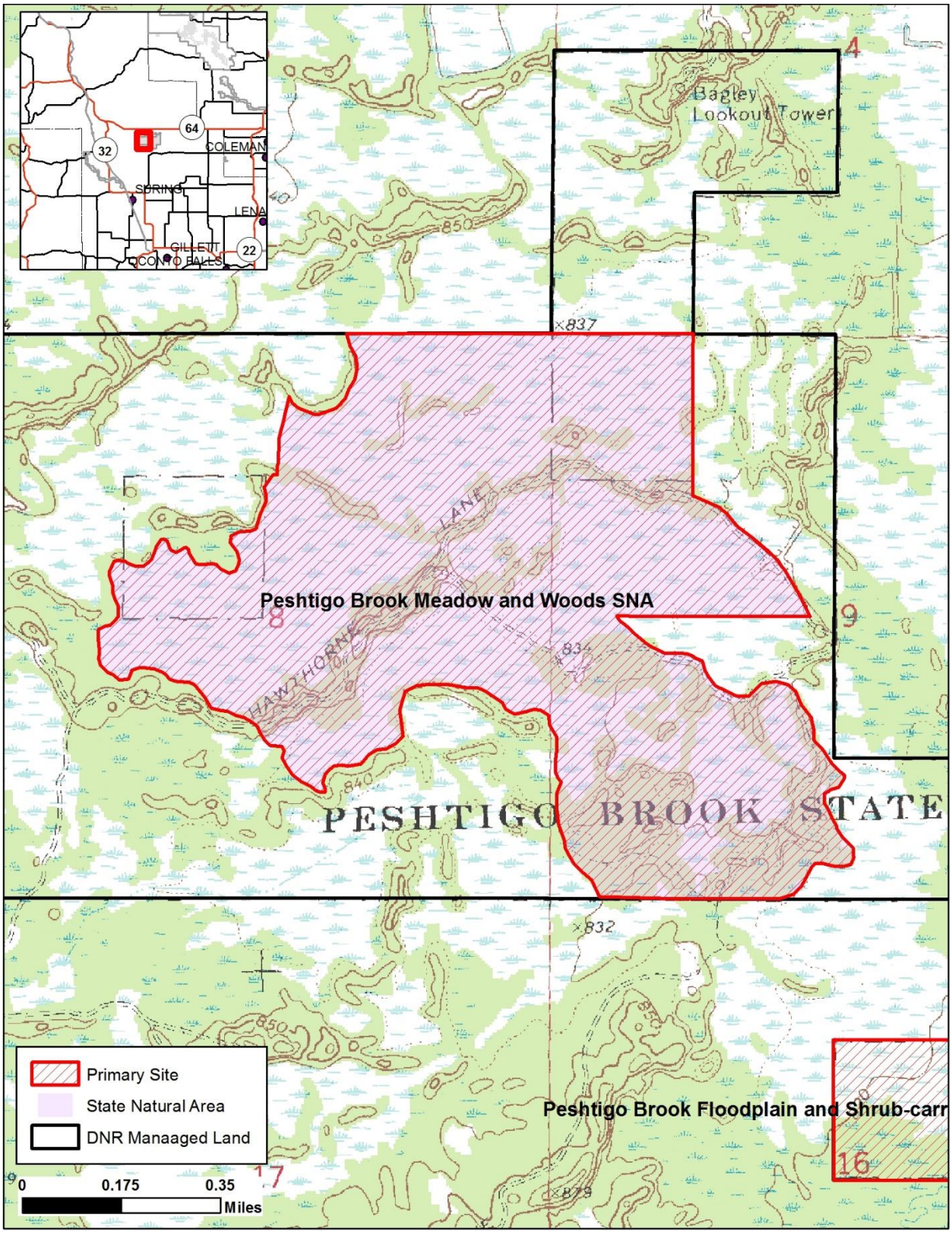
Significance of Site

The northern sedge meadow and shrub-carr are virtually undisturbed and represent a unique landscape setting nestled among the low sandy ridges. The site supports several rare and uncommon breeding birds, like veery, wood thrush, sedge wren, black-billed cuckoo, willow flycatcher, and pileated woodpecker as well as a rare plant. The site lies within the Brazeau Swamp COA, designated for its vast wetland complexes featuring high quality forests, sedge meadows, and extensive shrub swamps of state significance (WDNR 2008). The site was designated a State Natural Area in 2008.

Management Considerations

Site objectives are to manage the site as a reserve for northern sedge meadow, shrub-carr, oak barrens and northern dry-mesic forest, as a wetland protection area, and as an ecological reference area. Natural processes will determine the structure of the dry-mesic forest, along with prescribed vegetation manipulation in the sedge meadow and barrens. Another objective is to provide opportunities for research and education on the highest quality sedge meadows.

The ecological characteristics of the oak barrens will be primarily shaped by an intensive fire management program. The sedge meadow species and barrens/forest understory species are managed actively through tree/shrub control using tree harvest, brushing and occasional fire to mimic natural disturbance patterns. The native dominant barrens/forest tree species (primarily oaks) are managed passively, though some thinning of the canopy may be needed. The native dry-mesic forest species are managed passively, allowing nature to determine their ecological characteristics. The dry-mesic forest will be allowed to convert over time to a more mesic forest condition. Other allowable activities across the entire site include control of invasive plants and animals, and access to suppress wildfires.



NESEL04. Peshtigo Brook Meadow and Woods SNA Primary Site

NESEL05. AMBERG SWAMP CONIFERS

Location

Property:	Amberg Wildlife Area
Landtype Association:	Butler Plains (212Tc03)
Approximate Size:	1139 acres

Description of Site

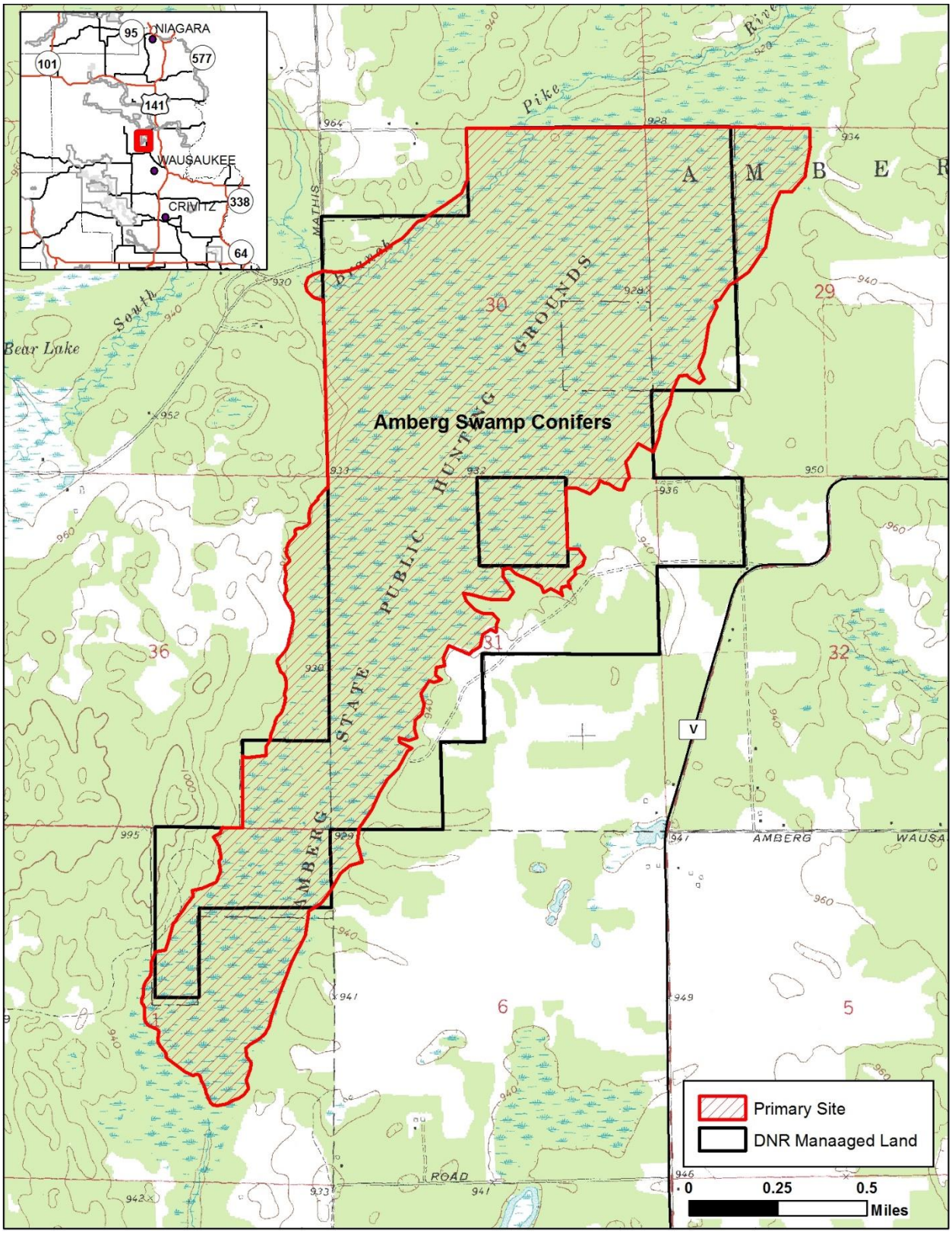
Located in the Amberg Wildlife Area, this site features an extensive forested wetland complex dominated mostly by swamp conifers. Much of the wetland is northern wet-mesic forest, with groves of solid northern white-cedar interspersed within a semi-open swamp of northern white-cedar, black ash, black spruce, red maple, balsam fir, and alder. Towards the southern end of the site, a black spruce swamp dominated by spruce and tamarack occupies a long, narrow swath in the central portion of the wetland basin. Finally, a small black ash swamp occurs on the northwest edge of the site along the Little South Branch Pike River. Overall, the site features five orchid species, indicative of its diversity of microsites, intact hydrology, and high overall ecological integrity. The surrounding uplands are being managed for globally rare pine barrens, adding to the value of the site.

Significance of Site

This site features a large conifer swamp of over 1000 acres, mostly in state ownership, with a closed to semi-closed canopy minimally impacted by roads or altered hydrology. This combination of large size and intact landscape is uncommon in northeast Wisconsin. The site lies within the Amberg COA, designated for its forested wetland blocks of state significance (WDNR 2008), and within the Athelstane Barrens Important Bird Area (Steele 2007). Uncommon breeding birds are present at or adjacent to the site and include Canada warbler, field sparrow, yellow-billed cuckoo, yellow-bellied flycatcher, and wood thrush. There is a rich mammal fauna found here with red-backed vole being most commonly found within peatland areas, woodland deer mouse was found in good numbers in the transitional zone between the cedar swamp and drier uplands while arctic shrew and short-tailed shrew were also encountered here.

Management Considerations

Protection of the native communities and associated species should be a priority. Management that perpetuates and enhances old northern wet-mesic forest, black spruce swamp, and hardwood swamp is warranted given the site's location in a COA of statewide significance and the high ecological integrity of these communities here. Active cedar management through timber harvest is not recommended due to regeneration difficulties. Given the relatively young age of cedars at the site (<100 years based on average stand origin) relative to their biological maturity (400 years), active management is probably unnecessary for the foreseeable future. Invasive species noted include reed canary grass and European marsh thistle. Regular monitoring of these and for other invasives is recommended.



NESEL05. Amberg Swamp Conifers Primary Site

NESEL06. DUNBAR BARRENS SNA

Location

Property:	Dunbar Barrens SNA
Landtype Association:	Sand Lake Plains (212Tc17)
Approximate Size:	1412 acres

Description of Site

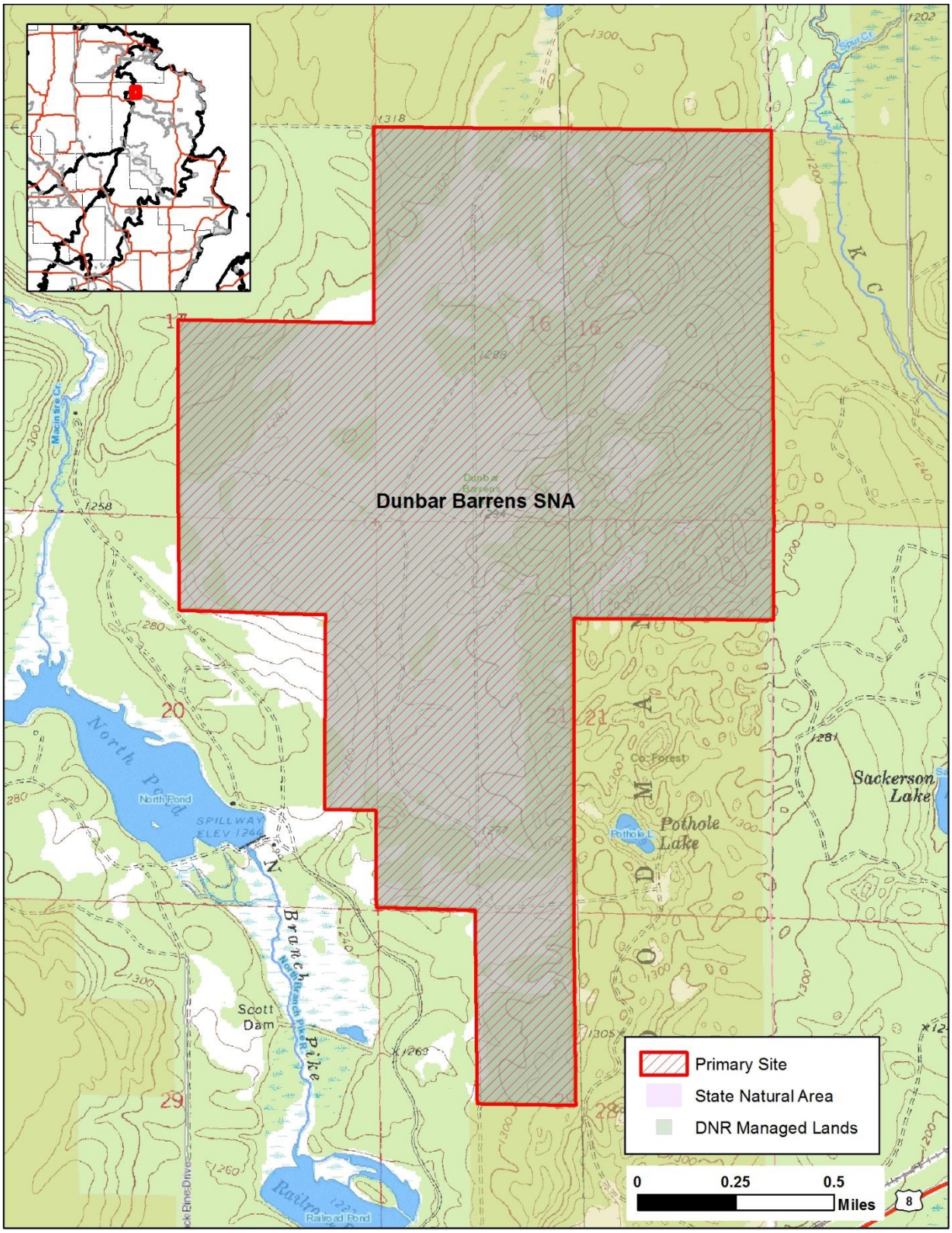
Dunbar Barrens SNA features pine barrens that is part of a large, open landscape located on a gently rolling pitted glacial outwash plain. Logging, grazing, and periodic fires have maintained the open character of the barrens in addition to the action of frost in low pockets. Today, aspen, oak, and jack pine forest surround the opening and low granitic outcrops are found scattered through the area. The dominant vegetation consists of grasses and sedges, and a well-developed shrub layer is present including blueberry, bearberry, prairie willow, and sweet fern. Herbaceous plants include rice grass, poverty oat grass, wintergreen, barren strawberry, and hawkweeds.

Significance of Site

This site is located within the Dunbar Barrens COA, featuring barrens communities of global significance (WDNR 2008). The site is similar in composition to presettlement barrens with broad sweeping prairie vistas and a distinctive panorama. The area also harbors a diverse and unusual lichen flora. Originally recognized as being attractive habitat for sharp-tailed grouse, the bird is today absent from the barrens after a population peak in the 1950's. While the last recorded observation was in 1976, it is still designated as an Important Bird Area for other species (Steele 2007). Common barrens birds include the eastern bluebird, eastern towhee, field sparrow and clay-colored sparrow. Dunbar Barrens was designated a State Natural Area in 1973.

Management Considerations

The stated objective for the SNA is to manage the site as a pine barrens reserve and as an ecological reference area. Natural processes and prescribed vegetation manipulation will determine the structure of the savanna, which is primarily open with scattered jack pine, red oak, northern pin oak, and aspen clones. Primary management techniques include tree and shrub control via harvest, brushing, and fire and are intended to mimic natural disturbance patterns. Additional management includes control of invasive plants and animals, maintenance of existing facilities, and access to suppress fires. Salvage of trees after a major wind event can occur if the volume of woody material inhibits fire prescriptions.



NESEL06. Dunbar Barrens SNA Primary Site

Future Needs

This project was designed to provide a biotic inventory of the biodiversity values for the Northeast Sands Ecological Landscape. Although the report should be considered adequate for master planning purposes, additional efforts could help to inform future adaptive management efforts, along with providing useful information regarding the natural communities and rare species of the NES EL.

Invasive Species

- A comprehensive invasive species inventory and management plan is needed. This plan should include a monitoring strategy for detecting and rapidly responding to new, high priority invasive threats. Early detection and rapid response is much more cost-effective than waiting until invasives are well-established on the landscape.

Natural Communities

- Conduct expanded surveys of lakes and pothole wetlands. Potential survey targets include aquatic macrophytes and water quality monitoring (including phosphorus and Chlorophyll-A), especially of lakes that are not monitored through other programs or projects.
- Conduct monitoring of oak barrens and pine barrens using coarse-level estimates of composition and structure.
- Experiment with using prescribed fire at different times of year (spring, summer, fall) and examine outcomes as they relate to management goals and objectives.

Rare Plants

- Continue to survey for rare plants not observed in the past 20 years.
- Monitor populations of rare Northeast Sands specialists such as dwarf bilberry, Blue Ridge blueberry, and Missouri rock-cress, as well as populations of rare species at the northwest edge of their range, such as dwarf milkweed.
- Consider re-introducing dwarf bilberry in locations where it was historically present but is no longer documented and in new suitable locations in the NES EL.
- Conduct additional surveys for Blue Ridge blueberry, currently known only from a handful of sites around a single state property.
- Monitor populations of blunt-lobed grape fern, a species which appears to be declining rapidly across its Wisconsin range.
- Conduct additional inventory work in bedrock communities for both vascular and nonvascular plants.

Birds

- Continue monitoring Kirtland's warbler, including nest productivity.
- Continue monitoring golden-winged warbler populations to better understand and mitigate declines of this regionally rare species.
- Continue monitoring grassland and barrens species such as grasshopper sparrow, bobolink, vesper sparrow, and red-headed woodpecker and continue to monitor nightjar populations (eastern whip-poor-will, common nighthawk) and other aerial insectivores across the landscape.
- Perform broadcast call surveys for rare forest raptors (red-shouldered hawk, northern goshawk) in appropriate mature forest stands and document nest sites.

Small Mammals

- Conduct additional small mammal surveys throughout the Ecological Landscape to inventory for common and rare barrens and forest species (e.g., woodland jumping mouse, woodland deer mouse, northern flying squirrel, etc.).

Herptiles

- Conduct monitoring of wood turtle (rivers) and Blanding's turtle (lakes/wetlands) and implement nest site restoration and protection where appropriate.
- Conduct inventory of mink frog via summer calling surveys.
- There is an historic record of the exceptionally rare eastern ribbonsnake (*Thamnophis sauritus*) found within the EL; future surveys may be warranted in their open bog and sedge meadow habitats.

Invertebrates

- Conduct inventory for northern blue butterfly, last documented in Wisconsin in 2014.
- Conduct additional inventory for bees, especially the yellowbanded bumblebee (*Bombus terricola*).
- Conduct additional inventory for the northern barrens tiger beetle in appropriate barrens habitat.
- Conduct inventory for aquatic beetles in high-quality coldwater and coolwater streams.
- Conduct inventory work in bedrock communities.
- Conduct inventory for freshwater mussels, targeting slippershell and other SGCNs.

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